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THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

EDITED BY WATSON DAVIS

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Saturday, June 27, 1925

AN INDEX OF OLD AGE
By Dr. Edwin E. Slosson

OF

Why does chick or child grow rapidly at first, then gradually slow down and finally stop growing altogether? How does it know when it has got its growth?

What checks the growth of a leg or a finger when it has reached the proper length? Sometimes of course it does not stop at the right time, and the unfortunate individual gets too tall to fit into a sleeping car berth, or carries through life unwieldy feet or an uncomely nose. But these exceptions only emphasize the rule.

Another mystery of like magnitude. When the individual has reach^{ed} maturity and his cells have lost their youthful zeal for expansion and settled down to a quiet life, there may arise an emergency that will set them off again. A cut or burn for instance may destroy a considerable mass of bone or muscle. The neighboring cells, quiescent for years perhaps, start to growing and multiplying at as rapid a rate as when they were young, and within a couple of days have made perceptible progress toward closing the wound. Also why is it that certain peaceful and orderly cells, without any apparent provocation, are suddenly seized with an imperialistic mania and develop a cancer?

We are so accustomed to such occurrences that we think they seem too "natural" to need explanation, yet until recently no one has been able to suggest a reason for them. But a new method of experimentation has been devised by Dr. Alexis Carrel of the Rockefeller Institute for Medical Research that promises to throw light upon these old questions. He has found it possible to pick out a few cells from the blood or flesh and grow them in glass flasks, where they can be experimented upon at will. If kept at the normal temperature and duly fed with blood serum and embryonic tissue juice they will thrive and multiply as well as in the body; better in fact, for they do not die of old age, but live on indefinitely. He started the artificial cultivation of a minute bit of cartilage from the heart of an unhatched chicken over twelve years ago, and it is growing yet, long after the fowl would have died if it had hatched.

Such cartilaginous tissue cannot live on serum alone. Apparently its protein has to be prepared for it by certain growth-promoting agencies that he calls "trephones", that is feeders. They are produced by the white blood corpuscles and certain glandular secretion, and they decrease with age. But besides

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this the serum contains some sort of substance that works the other way. It **restrains or prevents** the multiplication of cells and so inhibits growth. The amount of this inhibiting factor in the blood increases with advancing age, rapidly at first and then more slowly.

This discovery affords a way of measuring the age of an animal by observing the effect of its blood serum on the cells under cultivation in the flasks. When, for instance, the cells were supplied with serum from a hen six weeks old they lived 43 days. In serum from a three month old hen they lived 30 days. In serum from a three year old hen they lived 15 days, and in serum from a nine year old hen the cells survived only 4 to 6 days. If this test could be sufficiently simplified we might be able to ascertain with accuracy the age of a spring chicken, instead of having to take the dealer's word for it.

Experiments with the blood of dogs gave the same results. The serum from a dog eight years old restrained the growth of the cells ten times as much as serum from a two weeks old pup.

Whether the method can be applied to human beings remains yet to be determined. If it can be we may be able some day to determine not only how old a person actually is, but why. And if the growth-promoting and the growth-restraining factors can be identified and independently prepared it may be possible to regulate their balance and restore it when it is disturbed.

ROCKS AND HILLS OF DAYTON TESTIFY FOR EVOLUTION

By Watson Davis

The very hills themselves testify for evolution.

The little town of Dayton, to be the scene of the now famous trial of Prof. J. T. Scopes for violation of the Tennessee anti-evolution law, could not be better placed geologically as the site for such a test to determine whether natural law, made by God, or statute law, made by man, shall prevail.

The very ground the courthouse is placed upon, the rocks of the landscape with the embalmed life of ages ago will all be irrefutable witnesses for the defense if men will but use their eyes and their brains.

West of the little country town of Dayton is Walden's Ridge, named for an event in a previous struggle that concerned the freedom of the body of man. It is appropriate that this ridge is composed of the youngest and most recent rocks of the region thereabout and that below it, exposed by the the wear and wash and the unevenness of the earth for milleniums, there is layer upon layer of rocks each representing different and progressively older deposits. The ridge itself is composed of sandstone interleaved with layers of coal, the natural source of one of the commercial products of Dayton. This is the record of the rocks that testifies today that there was a time when trees looked like gigantic ferns and had spores instead of seeds. Look at a piece of coal under the microscope and those spores can be seen and identified today.

Close by the coal seams are layers of iron ore made by the accumulative activities of millions of bacteria millions of years ago. And lower down in the hills

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and earlier in age are strata of limestone, useful to man in utilizing the iron. These many layers of rocks were made by nature in the geological era now called by scientists the Carboniferous on account of its coal. Below them there are Devonian and Silurian rocks and earth upon which the town of Dayton itself rests, and out of which spring the strawberries and peaches, the principal products of the region.

In all of these rock layers evidence of prehistoric life can be found. There are spores of the trees that made the coal, calcified remains of trilobites, ancestors of the modern cockroach, fossil tree trunks, and other animal and vegetable remains of a time that antedated man by millions of years.

Is it any wonder that it was Dr. G. W. Rappleyea, superintendent of the Cumberland Iron and Coal Co., who instigated the anti-evolution test case against the young Dayton high school science teacher, Scopes? For in his work of finding iron and coal, he has learned the reliability of the record of the rocks.

Scopes, too, knows how to read the story chronicled in limestone, shale, iron and coal. And it makes him more determined that he shall not be prevented from teaching his eager young pupils the most basic, most interesting and most fundamental facts of nature.

Perhaps, if the question of the reality of evolution arises in the evolution trial set for July 10, it would be well for the judge to have the jury take a walk among the hills and see for itself just how, at one stage in the world's history. Nature slowly and purposefully, conducted the building of the earth.

TENNESSEANS READING EVOLUTION BOOKS

The fundamentalist legislator who wrote the anti-evolution law of Tennessee will hardly believe that he has materially helped the dissemination of the scientific facts of evolution.

But there is no question but that the people of Tennessee have learned more about evolution since the national interest in the Scopes case at Dayton, just an hour's train ride from Chattanooga, than they have since Darwin started to study nature.

Evolution has long been unorthodox. Darwin was linked with the devil. Now when evolution is outlawed in the schools, when the law says: "Don't", when an attempt is made to hide the facts, the people start to think for themselves.

The Carnegie Library of Chattanooga, somewhat bulging with good books, has a surprisingly adequate shelf of books on evolution. Before Scopes was arrested for the heinous crime of teaching evolution these books on evolution were consulted only occasionally. Now every book on evolution is in circulation or spoken for. Business men, school children to whom evolution is forbidden fruit, and many others are reading Darwin's "Descent of Man", Osborn's "From The Greeks to Darwin", Huxley's "Essays", and dozens of other books by Conklin, Kellogg, LeConte and other evolutionists. The bookstores report a brisk demand for evolution literature, and one shop handling lowpriced pamphlets has had to reorder the evolution booklets several times. Evolution is taught on the front page of every newspaper. In Nashville, Knoxville and Memphis similar conditions exist.

Thousands are expected to attend the Dayton trial, millions will read the newspaper accounts of the trial and listen over the radio. Prof. Scopes instead of teaching evolution to only a dozen or so of high school boys and girls will have a nation in his classes.

It is important to science, of course, that the Tennessee anti-evolution law be declared unconstitutional, for there can be no adequate teaching of science or medicine with such a ban in force. But in the meanwhile, knowledge of the scientific facts, the best antidote to the anti-evolutionist, is becoming widespread.

DARTMOUTH PROFESSOR SAILS FOR ARCTIC IN SEARCH OF A MISSING LINK

The real missing link in the evolutionary chain according to Professor William Patten, who teaches the Freshman course in evolution at Dartmouth College, is not the immediate progenitor of man, but a much more remote ancestor, which connected the fishes with the earlier invertebrate forms. Professor Patten has long held that the secret of this problem would be found in the oldest fish-like animals known, the Ostracoderms, who made their appearance in the early Paleozoic, long before the first true fishes came into existence. The last representatives of this class died out in the Carboniferous era and their fossil remains are rare and fragmentary.

But Professor Patten has heard of a new find of these fossils on the northwest corner of Spitzbergen, and he is starting as soon as possible to explore the locality for this new evidence of evolution. From the northern point of Norway he will proceed to Spitzbergen, five hundred miles north, and then charter a motor boat to convey him along the coast of the islands.

Professor Patten's motive in undertaking this voyage of exploration may be given in his own words;

"To the biologist, the real 'missing link' in animal evolution is not between man and apes but between vertebrates and invertebrates. For the genesis of practically every great system of organs in man can be traced in various ways without serious question to corresponding organs in the fishes. But there the genetic trail ends.

"Thus there is the greatest difference of opinion as to what class of invertebrates gave rise to the fishes and through them to the higher vertebrates. Many biologists now regard this problem as insoluble. I am not of that opinion. I have worked on various aspects of it for nearly forty years and am convinced that I have found essentially the correct solution. The recent finds in Spitzbergen, judging from the as yet brief preliminary accounts, confirm my prediction in a most striking manner.

"This problem has great practical as well as theoretic possibilities. Its solution would more than double our present perspective of the course and manner of animal evolution. Moreover, three of the oldest, and most important organs of man from a medical standpoint, are the pineal gland, the pituitary organ, and the thyroid. They apparently have essentially the same structure and functions in all the back-boned animals from man down to the fishes. If we can prove that the ancestors of the Ostracoderms and fishes were spider like animals, as I believe we can, the homologues of these mysterious organs can be readily identified in living invertebrates, such as modern scorpions and the horseshoe crab. It would then be possible

The first part of the paper deals with the history of the disease, and the second part with the pathology and the treatment.

The author states that the disease is a very common one, and that it is often fatal. He also states that the disease is often associated with other diseases, and that it is often treated with success.

The author then discusses the pathology of the disease, and states that it is a disease of the blood, and that it is often associated with other diseases.

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for the experimental biologists and medical men to learn something definite about their history and initial functions that should be of great importance in the treatment of the diseases in man due to abnormalities of the ductless glands."

WOMAN ASTRONOMER HONORED BY OXFORD UNIVERSITY

For hundreds of years, Oxford University, in England, has been giving honorary degrees to leading men in the fields of science and art, but for the first time, a woman was so honored when the degree of Doctor of Science was conferred on Miss Annie Jump Cannon, of the Harvard College Observatory, in recognition of a long series of valuable contributions to astronomy, chief of which is the completion of a catalog of 225,300 stars - "The Henry Draper Catalog of Stellar Spectra".

This catalog was inspired by the late Prof. E. C. Pickering, former director of the observatory, and supported by funds provided as a memorial to Dr. Henry Draper of New York, who made some of the first successful astronomical photographs. It was started in 1911 and published as it progressed, the last volume appearing last summer. The complete work includes nine large volumes.

Miss Cannon sailed for England on June first and received the degree in person. She will visit astronomers in other parts of England and in France and will attend the triennial meeting of the International Astronomical Union at Cambridge, England, in July. She is a member of the Union's International Committee on Spectral Classification.

A native of Dover, Delaware, Miss Cannon attended Wellesley College, graduating in 1884 with the degree of B.S. Her connection with the Harvard Observatory began in 1897. Since then her work, in addition to the Henry Draper Catalog, has included a long series of observations of variable stars, a bibliography of the literature on variable stars, containing about 75,000 references, the discovery of 200 variable stars, 4 new stars and one spectroscopic binary, a double star with the two parts so close that only the spectroscope reveals their duplicity. Much of this work was done at the Harvard Observatory branch station at Arequipa, Peru.

Among the other honors that she has received are honorary membership in the Royal Astronomical Society of Great Britain, and in the American Philosophical Society of Philadelphia; honorary degrees of Doctor of Science from the University of Delaware in 1918; Doctor of Astronomy from the University of Groningen, Holland, in 1921; and Doctor of Laws from Wellesley, her alma mater, last month. In addition, she has been selected as one of the twelve greatest living American women, by the National League of Women Voters.

A single fly may carry anywhere from 550 to 6,600,000 disease germs.

Foreign countries are adopting the type of parachute developed and used by the U. S. Army Air Service to make aviation safer.

From 12 to 15 per cent. of the pork produced in the United States each year is exported.

The first of the three main sections of the book is devoted to a general survey of the Western Hemisphere, and is written by the author of the first two volumes of the series.

THE WESTERN HEMISPHERE

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FRENCH RADIO USED TO PROMOTE ESPERANTO

Radio has come into the field as a means of spreading the use of Esperanto, the language designed for international use. The Esperantists of Europe have long seen in the new method of communication the best possible agency for popularizing their language. With the cooperation of Radio-Paris, one of the principal French broadcasting stations, the new tongue is to be given voice by wireless for the purpose of gaining Esperanto recruits among the millions of European radio fans.

In Europe, unlike the United States, there is great confusion of tongues for the listener-in. The countries are densely crowded and a single message will have an audience made up of the users of a score of languages.

This condition has given the Esperantists their opportunity. Through the agency of Radio-Paris a series of fourteen lessons in the universal language are being broadcast, and a prize of 1000 francs has been offered for the best Esperanto student among listeners-in.

MALE SEX GLANDS SUCCESSFULLY TRANSPLANTED

For the first time in history of scientific research male sex glands in lower animals have actually been transplanted and made to persist imperfectly normal condition. The announcement was made recently at the University of Chicago where Prof. C. R. Moore has solved a problem that has been troubling biologists since 1796.

Dr. Moore has developed a technic that has enabled him to transfer male sex glands from one laboratory animal, such as a rat or rabbit, to another of the same species but of a different age. This transferred tissue has developed a blood supply from a set of blood vessels that does not normally supply it, has grown for months under new conditions, and on removal for examination has been found to have carried on its normal function.

Dr. Moore explains the work as follows, revealing the difficulties involved in his experiments and those that have preceded him.

"Despite a more or less intensive study of sex gland transplantation for many years past by biologists all over the world, the conditions underlying the successful incorporation of such tissues removed from one animal to another, or from one place to another in the same animal have not been well understood.

"The work involved the separation of a very delicate piece of tissue from its normal environment and its normal blood supply, and the transfer of it to another animal or another locality in the same animal. Unless the tissue meets conditions sufficiently favorable to enable it to establish a new blood supply it will very soon die and be removed by the protecting mechanisms of the body as any foreign body might be so disposed.

"The female sex gland has been transplanted with considerable success for many years, and in many cases retained its normal condition and function, but the male sex gland of mammals has been found more difficult to work with on account of its very sensitive nature. Until recently it has never been transplanted, even from one place to another in the same mammalian organisms with anything like persistence in its normal conditions.

The first of these is the fact that the body is not a simple mass of matter, but a complex of many different parts, each of which has its own function to perform. The second is the fact that the body is not a static entity, but a dynamic one, constantly changing and adapting itself to its environment. The third is the fact that the body is not a passive recipient of external influences, but an active participant in the process of life.

The fourth is the fact that the body is not a mere collection of organs and tissues, but a unified whole, in which all the parts are interrelated and interdependent. The fifth is the fact that the body is not a simple machine, but a complex system, in which the various parts work together to achieve a common purpose. The sixth is the fact that the body is not a static entity, but a dynamic one, constantly changing and adapting itself to its environment.

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"With the knowledge gained from many different lines of investigation during the last seven years, facts have been uncovered and so utilized that I am now able to announce the persistence of portions of the male sex gland of mammals in a perfectly normal condition.

"The male gland transplantation in mammals has been studied by many European workers and persistence of some structures of it have been obtained for the past twenty-five years. The tissue persisting, however, has never been found in a normal condition. Structurally it has been altered very considerably and has never been found to carry on its normal function of producing mature sex cells. It has been considered impossible, up to the present time, to so far carry over from one animal to another the male sex gland of the mammal and to obtain its incorporation so that it could carry on its normal function of producing germ cells."

OLIVE OIL MADE CURE FOR RICKETS BY ULTRA-VIOLET RAYS

That such fats as olive oil and lard may be activated by exposure to ultra-violet rays and used as a substitute for cod liver oil in the treatment of rickets is shown by experiments about to be reported by the Department of Agricultural Chemistry of the University of Wisconsin in a forthcoming issue of the Journal of Biological Chemistry.

Until recent years, rickets has been a scourge among babies. Only within the past few years has science demonstrated that rickets is due to a deficiency of calcium in the bones and that the oil from the liver of the codfish will prevent and even cure the disease.

In the series of experiments now published olive oil and lard were each exposed to the action of the ultra-violet rays from a powerful mercury vapor quartz lamp for periods of time ranging from 30 minutes to seventeen hours.

After exposure to the rays these fats were fed to a group of experimental rats in which rickets had been produced and the activated olive oil and lard were found to have the same beneficial results that followed the administration of cod liver oil. Not only did the weight of the rats increase, but an analysis of the bones showed an increase in the calcium content.

Some of the activated olive oil that had been stored in a stoppered bottle showed no change in potency after a period of ten months.

It was found also that the fats might be activated by the rays from the open carbon arc, the iron arc, and by sunlight, but that exposure for prolonged periods such as seventeen hours destroyed the potency of the fats, this effect being produced even on the cod liver oil.

Eggs kept in cold storage in a frozen condition for nearly nine years still retain their power to promote growth in rats.

More than 80,000,000 swine were slaughtered in the United States last year.

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THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION
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SPONGES USED AS HOUSES BY MANY SEA CREATURES

Sponges are the bee hives of the sea. This curious discovery has been reported to the U. S. Bureau of Fisheries here by Dr. Charles J. Fish of the scientific staff of the New York Zoological Society's steamer "Arcturus" cruising in tropical waters.

The "bees" which Dr. Fish found inhabiting the canals of sponges were whole colonies of the tiny snapping shrimp, *Alpheus*. These gregarious shrimps, he discovered, swim freely about but always return to the individual sponge which is their hive-like home.

Numerous other forms were also found to use these subway passages as a haven of refuge at the approach of danger. One sponge-hive with its honing shrimps was secured and placed in an aquarium aboard ship where the colony continued to flourish.

This discovery makes known another of Nature's queer partnerships; for the sponge which the shrimps use as a home is itself a marine animal, although it spends its adult life fixed to the rocks in one place, like a plant and the canals which shelter the shrimps are the many mouths through which the sponge gets its food.

SAME LAMP GIVES LIGHT OF TWO DISTINCT COLORS

Remarkable decorative effects have been made possible by a new lamp arrangement presented to the French Academy of Sciences by M. Georges Claude. Two different colored lights are produced in alternate sections of the same lamp at the same time. By forming a neon and mercury lamp in the shape of a tube containing constrictions, the orange glow of neon is obtained in the larger parts of the tube while the white light of mercury shines from the narrowed parts. If these lamps are made as uniform cylindrical tubes, however, only the yellow light of neon is seen.

COLLEGE STUDENTS PREFER FAIRNESS TO BRAINS

The college instructor who would be popular with students need not thrill them with his brilliance, but he must be fair in grading and courteous, according to a test made with 40 seniors at Purdue University. Tact, sympathy, and cooperation are the qualities which the students regarded as most essential to popularity.

Prof. George C. Brandenburg, who reports the results of these tests in a coming issue of the "Journal of Applied Psychology", expresses surprise that the students do not demand intellectuality in an instructor as one of the first desirable qualities. But he concludes that "after all, students are only human and apparently crave first the same humane qualities in their instructor that they demand in their classmates".

The ten qualities most agreeable in an instructor were rated by the students in the following order: honesty and fairness in grading, courtesy and consideration, liberal and progressive attitude, cheerfulness, clearness, punctuality, generosity, cleanliness and neatness, morality, intellectuality.

The students held that the ten most disagreeable traits an instructor can have, in order of their importance, are: lack of courtesy in the classroom, unfair practices in grading, disagreeable qualities of disposition, egotism, irritating personal habits and peculiarities, lack of cordiality, lack of punctuality, lack of dependability, lack of public spirit, and untidiness in dress.

GERMANY TO GREASE WHEELS WITH COAL TAR PRODUCTS

Petroleum oil may be supplanted as a lubricant in most German industries by oils produced from lignite and coal tar. Dr. Baum of the Commission on Mining Engineering, Heat and Power Utilization, estimates that 80 per cent. of Germany's requirements can be supplied at less cost by improvements of lubricants which were produced during the war when Germany was cut off from sources of Russian and American lubricating oils. These tar oils are not suitable, however, for the lubrication of steam engine cylinders, air compressor cylinders, or turbines.

TRY FOR ACCURACY AND YOU'LL GAIN SPEED IN TYPING

Development of accuracy is more important than speed in learning to do certain mechanical operations, according to Dr. Garry Cleveland Myers, of Cleveland, Ohio, who will report a new series of experiments in a forthcoming issue of *The Journal of Personnel Research*.

Typewriting was done by two squads of seven girls each, practising three minutes a day for thirty-six days. One group was instructed to work for speed and were reminded by their instructor at each trial to speed up all they could. The other group was cautioned at each trial to take great care that no errors were made.

At the end of the period the accuracy group had not gained much over the speed group; but later, after four months without practice, when each group copied, for speed, unfamiliar material for ten minutes, the speeders wrote an average of 383 words, while the accuracy squad wrote an average of 451 words. The average of the accuracy workers was 1.2 words wrong per hundred; that of the speeders was 2.2.

A later series of experiments corroborated the finding that if attention was directed solely to speed, accuracy tended to diminish. On the other hand, if attention was directed solely to accuracy, speed tended to increase.

JADE DISCOVERED IN SOUTH AFRICA

An important discovery of jade has been reported from a farm near the town of Brits in the Transvaal. The stone was found in the various shades of blue, white, pink, and green, and in quantities large enough to warrant commercial exploitation. The discovery was made during prospecting operations for chrome iron.

A company has been formed with headquarters in Johannesburg, and has obtained permission from the government to bring in Chinese jade experts as cutters and polishers so that the jade may be marketed as beads and art ornaments.

ANCIENT BONES TOUGHENED BY NEW PROCESS

The warning "handle with care" may no longer be so necessary in museums and laboratories where valuable bones of dinosaurs, mastodons, and our own departed ancestors are preserved and studied, according to Prof. E. C. Case, of the University of Michigan, who has found that by use of a varnish made from Bakelite fragile material may be preserved in a practically indestructible medium. The usual means of making such specimens somewhat more durable has been to treat them with shellac.

As an illustration of the success of the new method, Dr. Case says: "A human skull was selected that the writer could have crushed in his hands. After treatment it was dropped upon a table top, cautiously at first, and finally from a height of eighteen inches upon its vertex without injury."

COLORED FLOOD LIGHTING MAKES "DREAM PICTURES"

Hundreds of color combinations, converting prosaic buildings into "dream pictures" are possible with a system of flood lighting developed by local engineers, and described as follows in the "Journal of Electricity".

"Imagine a cream-tinted terra cotta and pressed brick facade, 90 ft. high, all bathed in a soft magenta or ruby light seeming to come from nowhere yet painting every brick and ornate projection with varying tints and shades of this dominant warm color. Then picture a mauve or purple band, with flecks of emerald green, reflected from a Corinthian colonnade extending another 30 ft. above the base of ruby tints; and above, a narrow band of emerald broken by a row of 21 flaming urns, the flame-colored light constantly in motion. Only a Maxfield Parrish could paint such a picture; only in the wonderful childhood dreams of fairyland could such a scene be brought before the mind."

A six foot long bull snake recently climbed a 45 foot pole, wrapped himself around an electric transmission line and interrupted service between El Reno and Enid, Okla.

Power from Niagara Falls was recently used to flood the Falls themselves with colored lights at night from twenty-four big searchlights.

A new British Embassy, built of reinforced concrete and especially designed to withstand earthquakes, is to be erected in Tokyo, Japan.

A species of cockroaches infests the huts of Laplanders and sometimes entirely devours the stores of dried fish put away for winter consumption.